August.1972 B72-10523

NASA TECH BRIEF

NASA Headquarters

Mechanically and Thermally Stable Maser Cavity Resonator

The problem:

The output frequency stability of a maser is greatly dependent on mechanical and thermal stability of the cavity resonator.

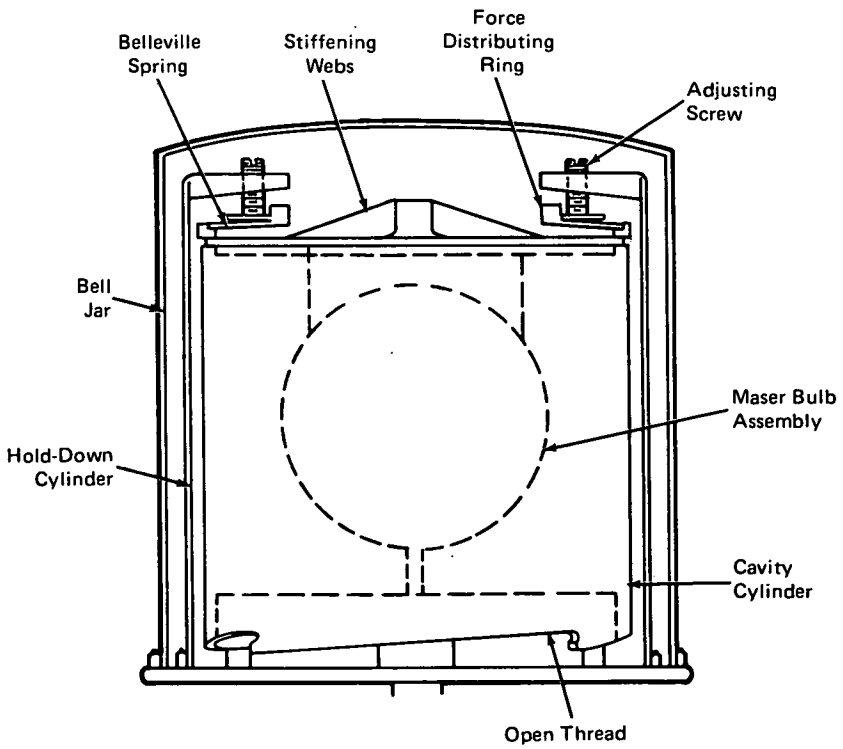
The solution:

A new type of cavity resonator has been designed for the hydrogen maser. The resonator consists of three pieces of glass-ceramic material having an extremely low thermal coefficient of expansion and provides very stable mechanical tuning.

How it's done:

The entire assembly is shown in the figure. The cavity assembly includes a top plate with three integral stiffening webs, a cylinder with a three-fold interrupted helical ramp at its bottom, and a base which contains the bottom plate. Tuning is accomplished by rotation of the cavity cylinder which is raised or lowered on its open thread.

A Belleville spring assembly provides uniform downward pressure at the outer circumference of the top plate. The tension of the spring is set so that the thermal



(continued overleaf)

movement of the aluminum hold-down cylinder relative to CER-VIT does not cause appreciable changes in the compressive force on the cavity.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Headquarters
Code KT
Washington, D.C. 20546
Reference: TSP72-10523

Patent status:

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning non-exclusive or exclusive license for its commercial development should be addressed to:

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NASA Headquarters
Code GP
Washington, D.C. 20546

Source: R. Vessot, T. E. Hoffman, and M. W. Levine of Astrophysical Observatory, Smithsonian Institution under contract to NASA Headquarters (HQN-10790)